A physiological approach for supporting oocyte-cumulus cell communication and chromatin remodelling at meiotic resumption Alberto Maria Luciano, Italy

Reproductive and Developmental Biology Laboratory, Department of Health, Animal Science and Food Safety, University of Milan, Milan, Italy

Short description of the presentation

In vitro embryo production (IVP) remains inefficient in both clinical applications of human reproduction and animal breeding and the development of pre-maturation strategies to improve IVP is a mayor challenge in assisted reproductive technologies. The diversity of oocyte competences is mainly due to the intrinsic heterogeneity of the cohort of follicles from which cumulus-oocyte complexes to be subjected to standard IVP procedures are isolated. In particular, the precocious meiotic resumption that occurs when oocytes are isolated from the follicles is the main factor that impairs oocyte ability to become an embryo in vitro. Here are presented a series of studies on physiological approaches to pre-maturation system in order to develop the suitable conditions for in vitro maturation that support high quality oocyte production. The large-scale chromatin remodeling process that occurs in the germinal vesicle has been considered as a specific hallmark of the progressive meiotic and developmental competencies acquisition during the final stages of oocyte differentiation in order to obtain high quality egg in vitro.

Keywords

Oocyte, chromatin, cumulus cells, germinal vesicle, gap junctions, cAMP, cGMP, phosphodiesterase, meiosis

References

Albertini, D.F., Combelles, C.M., Benecchi, E., and Carabatsos, M.J. (2001). Reproduction 121(5), 647-53
Atef, A., Paradis, F., Vigneault, C., and Sirard, M.A. (2005). Mol Reprod Dev 71(3), 358-67
Blondin, P., and Sirard, M.A. (1995). Mol Reprod Dev 41(1), 54-62
Bonnet-Garnier, A., Feuerstein, P., Chebrout, M., Fleurot, R., Jan, H.U., Debey, P., and Beaujean, N. (2012). Int J Dev Biol 56(10-12), 877-87
Dieci, C., Lodde, V., Franciosi, F., Lagutina, I., Tessaro, I., Modina, S.C., Albertini, D.F., Lazzari, G., Galli, C., and Luciano, A.M. (2013). Biol Reprod 89(3), 68
El-Hayek, S., and Clarke, H.J. (2015). Biol Reprod 93(2), 47
Eppig, J.J. (2001). Reproduction 122(6), 829-38
Fair, T. (2003). Anim Reprod Sci 78(3-4), 203-16
Fair, T., Hulshof, S.C., Hyttel, P., Greve, T., and Boland, M. (1997). Mol Reprod Dev 46(2), 208-15
Franciosi, F., Coticchio, G., Lodde, V., Tessaro, I., Modina, S.C., Fadini, R., Dal Canto, M., Renzini, M.M., Albertini, D.F., and Luciano, A.M. (2014). Biol Reprod 91(3), 61
Franciosi, F., Lodde, V., Goudet, G., Duchamp, G., Deleuze, S., Douet, C., Tessaro, I., and Luciano, A.M. (2012). Mol Hum Reprod 18(5), 243-52
Gruzova, M.N., and Parfenov, V.N. (1993). Int Rev Cytol 144, 1-52
Li, R., and Albertini, D.F. (2013). Nat Rev Mol Cell Biol 14(3), 141-52
Lodde, V., Modina, S., Galbusera, C., Franciosi, F., and Luciano, A.M. (2007). Mol Reprod Dev 74(6), 740-9
Lodde, V., Modina, S., Maddox-Hyttel, P., Franciosi, F., Lauria, A., and Luciano, A.M. (2008). Mol Reprod Dev 75(5), 915-24
Lodde, V., Modina, S.C., Franciosi, F., Zuccari, E., Tessaro, I., and Luciano, A.M. (2009). Eur J Histochem 53(4), e24
Luciano, A.M., Franciosi, F., Modina, S.C., and Lodde, V. (2011). Biol Reprod 85(6), 1252-9
Luciano, A.M., and Lodde, V. (2013). In 'Oogenesis.' (Eds. G Coticchio, DF Albertini and L De Santis) pp. 93-108. (Springer London)
Luciano, A.M., Modina, S., Vassena, R., Milanesi, E., Lauria, A., and Gandolfi, F. (2004). Biol Reprod 70(2), 465-72

Luciano, A.M., Pocar, P., Milanesi, E., Modina, S., Rieger, D., Lauria, A., and Gandolfi, F. (1999). Mol Reprod Dev 54(1), 86-91
Mattson, B.A., and Albertini, D.F. (1990). Mol Reprod Dev 25(4), 374-83
O'Brien, M.J., Pendola, J.K., and Eppig, J.J. (2003). Biol Reprod 68(5), 1682-6
Ozawa, M., Nagai, T., Somfai, T., Nakai, M., Maedomari, N., Fahrudin, M., Karja, N.W., Kaneko, H., Noguchi, J., Ohnuma, K., Yoshimi, N., Miyazaki, H., and Kikuchi, K. (2008). Mol Reprod Dev 75(5), 857-66
Sanchez, F., Romero, S., De Vos, M., Verheyen, G., and Smitz, J. (2015). Hum Reprod 30(6), 1396-409
Shu, Y.M., Zeng, H.T., Ren, Z., Zhuang, G.L., Liang, X.Y., Shen, H.W., Yao, S.Z., Ke, P.Q., and Wang, N.N. (2008). Hum Reprod 23(3), 504-13
Thomas, R.E., Armstrong, D.T., and Gilchrist, R.B. (2004). Biol Reprod 70(3), 548-56
Vanhoutte, L., Nogueira, D., Dumortier, F., and De Sutter, P. (2009). Hum Reprod 24(8), 1946-59